3 (Sem–5 / CBCS) ZOO HC 1

2025

ZOOLOGY

(Honours Core)

Paper : ZOO–HC–5016

(Molecular Biology)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Choose the correct answer : 1×7=7

   (a) During elongation of polypeptide chain in translation, the peptide bonds are formed by the enzyme

   (i) peptidyl transferase

   (ii) peptidyl ligase

   (iii) aminoacyl tRNA synthetase

   (iv) peptidyl polymerase

   (b) In the process of DNA synthesis in *E. coli*, the RNA primers are excised by the exonuclease activity of

   (i) DNA polymerase I

   (ii) DNA polymerase II

(iii) DNA polymerase III

(iv) DNA ligase

(c) Tryptophan operon in *E. coli* is an example of

(i) inducible operon

(ii) positively regulated operon

(iii) repressible operon

(iv) All of the above

(d) Which of the following amino acids has the greatest number of codons ?

(i) Proline

(ii) Leucine

(iii) Tryptophan

(iv) Aspartic acid

(e) The DNA binding protein that initiates the transcription of bacterial genes is called

(i) operator

(ii) sigma factor

(iii) repressor

(iv) promoter

(f) In the carbon skeleton of the pentose sugar in DNA, the attachment point of a base to form a nucleoside is

(i) C_1

(ii) C_2

(iii) C_3

(iv) C_5

(g) Which of the following is not a post-transcriptional modification ?

(i) Splicing

(ii) 5′ capping

(iii) 3′ adenylation

(iv) Glycosylation

2. Write short notes on the following : ***(any four)*** 2×4=8

(a) Watson-Crick model of DNA.

(b) RNA splicing

(c) rho-independent termination

(d) Riboswitches

(e) Degeneracy of the genetic code

3. Answer ***any three*** from the following questions : 5×3=15

(a) Citing proper examples, write the role of inhibitors of protein synthesis.

(b) Write a note on replication of telomeres.

(c) What is pyrimidine dimerization ? Explain the photoreactivation repair of thymine dimers in DNA. 1+4=5

(d) What do you mean by gene silencing? Write the role of silencers in the process of transcription. 2+3=5

(e) Write the salient features of B-form of DNA.

4. Give an illustrative account on the regulatory mechanism of *lac* operon in *Escherichia coli.* 10

Or

Write the role of activators and enhancers in transcription regulation of eukaryotes. 5+5=10

5. What is the difference between prokaryotic and eukaryotic ribosome? Briefly explain the assembly of a prokaryotic ribosome and discuss about the functional sites or active sites of a ribosome. 1+(5+4)=10

Or

Explain the mechanism of protein synthesis in prokaryotes. 10

6. Briefly explain the mechanism of DNA replication in prokaryotes. 10

Or

What do you mean by a promoter site? Explain the mechanism of transcription in prokaryotes with suitable diagrams. 2+8=10
